

ABSTRACT OF THE DISCLOSURE

A method of forming a silicon-on-insulator semiconductor device including providing a substrate and forming a trench in the substrate, wherein the trench includes opposing side walls extending upwardly from a base of the trench. The method also includes depositing at least two insulating layers into the trench to form a shallow trench isolation structure, wherein an innermost of the insulating layers substantially conforms to the base and the two side walls of the trench and an outermost of the insulating layers spans the side walls of the trench so that a gap is formed between the insulating layers in the trench. The gap creates compressive forces within the shallow trench isolation structure, which in turn creates tensile stress within the surrounding substrate to enhance mobility of the device.